REMARKS

Status of the Claims

Claims 1-36 remain pending in the application. Claim 21 has been amended to more clearly define the present invention.

Claims Rejected Under 35 USC § 102(e)

The Examiner has rejected Claims 21-22, 25, and 27 as being anticipated by Itokawa (U.S. Patent No. 6,636,644). The Examiner asserts that Itokawa describes each element of applicants' claimed invention. Applicants respectfully disagree with the rejection. Nevertheless, applicants have amended independent Claim 21 to more clearly define the invention so that it is apparent how applicants' claimed invention distinguishes over Itokawa, as further discussed below. In the interest of reducing the complexity of the issues for the Examiner to consider in this response, the following discussion focuses on the amended independent Claim 21. The patentability of each remaining rejected dependent claim is not necessarily separately addressed in detail. However, applicants' decision not to discuss the differences between the cited art and each rejected dependent claim should not be considered as an admission that applicants concur with the Examiner's conclusion that these dependent claims are not patentable over the disclosure in the cited references. Similarly, applicants' decision not to discuss differences between the prior art and every claim element, or every comment made by the Examiner, should not be considered as an admission that applicants concur with the Examiner's interpretation and assertions regarding those claims. Indeed, applicants believe that all of the dependent claims patentability distinguish over the reference cited. However, a specific traverse of the rejection of each dependent claim is not required, since dependent claims are patentable for at least the same reasons as the independent claims from which the dependent claims ultimately depend.

With regard to amended independent Claim 21, applicants have clarified their recited method for padding a macroblock of a video object to more clearly distinguish over Itokawa. Significant differences exist between Claim 21 and Itokawa, not only with regard to the functions carried out by the host processor and graphics coprocessor, but also with regard to the definitions of a graphics primitive and texture data.

Applicants' claim language reciting the function of the host processor and the graphics coprocessor is neither implied nor suggested by Itokawa. Applicants' host processor determines horizontal and vertical graphics primitives for the video object as a function of object shape data that

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are stored in the host memory accessible by the host processor and communicates the primitives to the coprocessor (see applicants' subparagraph (a) of Claim 21 and applicants' specification, page 2, line 37 – page 3, lines 1-2). In addition, the host processor transfers the data over a data bus to the graphics coprocessor (see subparagraph (b) of Claim 21 and applicants' specification, page 6, lines 21-22). The Examiner asserts that Itokawa anticipates the recited function of the host processor because the term "host processor" is broad enough to include an "object extraction unit," which is used in Itokawa to process shape data. The Examiner further asserts that this reference discloses the function of applicants' recited graphics coprocessor because that term is broad enough to include the padding block generating unit of Itokawa, which processes a padding operation, depending on shape data. However, the supporting citations referenced by the Examiner in Itokawa clearly teach that the object extraction unit and padding block generation units of Itokawa perform different functions when compared to applicants' host processor and coprocessor functionality, respectively. Specifically, the object extraction unit detects a region where the object is present and ***generates*** shape data (Itokawa, Column 13, lines 28-29 – emphasis added). In contrast, applicants' host processor does not detect a region where the object is present and does not generate shape data; it accesses the object shape data that are already stored in the host memory. Furthermore, the Examiner concedes that Itokawa does not teach that shape data are stored in memory (Office Action, page 7, lines 17-18). Thus, the term host processor as recited by applicants' claims is not the same as the object extraction unit as disclosed by Itokawa, because Itokawa's object extraction unit performs a different function than applicants' host processor.

In addition, even assuming arguendo, as the Examiner asserts, that Itokawa's object extraction unit and the host processor have equivalent functionality or that the Y padding and chroma padding block generation units' are functionality equivalent to applicants' graphics coprocessor, Itokawa's FIGURE 11 shows that all functions are carried out either by a host processor or by a graphics coprocessor, since there is no teaching or suggestion in the reference that data are communicated by object extraction unit to padding block generation unit the across a data bus, as currently recited by applicants' Claim 21. The Examiner even concedes that Itokawa lacks a data bus (Office Action, page 8, line 5). Contrary to the Examiner's assertion, there would be no reason to modify Itokowa as taught by Chen to include any data bus, since there is no need to communicate data between the object extraction unit and padding block generation unit, since it appears that these component are

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within the same component. Thus, applicants' recitation of a host processor and graphics coprocessors and their functionality is not anticipated by or obvious in view Itokawa's object extraction unit or Y padding and chroma padding block generation units, which are on a single board with no need to communicate over a data bus.

Applicants' recited language in the claims concerning texture data and a graphics primitive is neither implied nor suggested by Itokawa. Itokawa and applicants define and use the term texture data in a dissimilar fashion. Specifically, applicants use the term texture data as it understood by those skilled in the art and have not provided any other definition in the specification. Those of ordinary skill in computer graphics will understand that texture data define a surface's characteristics and appearances. Texture data may include but are not limited to data relating to how to contour, shade, rotate, share or apply a color (or pattern) to an object in various ways (*OpenGL Programming Guide,* Available at http://www.dcc.unicamp.br/~lmarcos/courses/mc603/redbook/chapter09.html). The Examiner asserts that Itokawa anticipates the function of applicants' graphics coprocessor because its padding block generating units utilize texture data. However, as used by Itokawa texture data only includes luminance "Y" data and color difference "chroma" data (see Itokawa, Column 1, lines 35-40 and Column 13, lines 37-58). Luminance and color data specify details of the display drive signals, and Itokawa's padding block generating units thus do not utilize texture data as normally understood by those of ordinary skill in this art. Also, applicants' graphics coprocessor does not use data like that taught by Itokawa. Accordingly, it will be apparent that Itokawa does not teach or suggest a functionally equivalent invention to that defined by applicants' Claim 21.

In addition, the Examiner asserts that the image object extracted based on the shape data in Itokawa corresponds to applicants' graphics primitive. Applicants respectfully disagree. Applicants' host processor issues one of several graphics primitive to the graphics coprocessor after a VOP bounding rectangle of macroblocks, preferably comprising 16 by 16 pixels, has enclosed a video object (see applicants' specification, page 6, lines 35-37). A transparent pixel corresponds to a portion of the texture data that must be padded with a value related to the texture data of one or more nearby pixels (see applicants' specification, page 7, lines 22-30). A graphics primitive can be a dot primitive, a horizontal line primitive or a line-v primitive (applicants' specification, page 7, lines 22-37). Thus, a graphics primitive is a specific padding command issued subsequent to the formation of macroblocks that enclose a video object. In contrast, Itokawa's object extraction unit

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generates shape data where the object is present, forms a bounding box on the basis of the shape defined by the shape data, and generates macroblocks that encompass four pixels (Itokawa, column 13, lines 28-32). Then, if chroma data extends across the boundary of the object (Itokawa, column 14, lines 19-21) chroma values of a target pixel are calculated as the average of chroma values of valid surrounding pixels, which are weighted, based on their distances (Itokawa, column 14, lines 26-29). Therefore, the image object extracted by Itokawa cannot be a graphics primitive, as used by applicants, as the Examiner asserts, since applicants' graphics primitive is a subsequent separate command based on an analysis of video object within the macroblock. And even assuming, *arguendo*, that Itokowa's method of setting chroma values of a target pixel using the average of chroma values of valid surrounding pixels is equivalent to one of applicants' graphics primitive commands, chroma values as discussed above are not texture data as that term is used in applicants' claims. Applicants' graphics primitive is concerned with padding a texture value. Thus, Itokawa lacks a graphics primitive and does not teach padding texture data as recited by applicants' claims.

The rejection of independent Claim 21 under 35 USC § 102(e) over Itokawa should be withdrawn for the reasons given above. Because dependent claims are considered to include all of the elements of the independent claims from which the dependent claims ultimately depend, and because Itokawa does not disclose or suggest all the elements of independent Claim 21, the rejection of dependent Claims 22, 25, and 27 over Itokawa should be withdrawn for at least the same reasons as the rejection of Claim 21.

A significant further difference also exists between Claim 25 and Itokawa with regard to how the method of padding the macroblock improves MPEG-4 processing. Applicants' method seeks to accelerate MPEG-4 video decoding on the same processing hardware used for MPEG-2 video decoding by implementing boundary macroblock padding more efficiently in order to ensure that the host and coprocessor run faster (see applicants' specification, page 2, lines 28-32). The Examiner asserts that Itokawa discloses the step of padding the macroblock to accelerate MPEG-4 video decoding by improving coding efficiency. However, the supporting citations referenced by the Examiner in Itokawa refer to improving coding efficiency of chroma padding by correcting a deficiency in matching color pixels that extend across the boundary of an object. When chroma data that include the outside color have values different that the neighboring chroma data in the object, the coding efficiency of that object is reduced (see Itokawa, column 2, lines 12-27). And the Examiner

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further notes that coding efficiency is improved when the chroma data are set on the object boundary with the same values as neighboring chroma data inside the object (Itokawa, column 7, lines 59-64). Thus, Itokawa's method does not teach or suggest applicants' method of improving processor efficiency and accelerating MPEG-4 video decoding, since Itokawa's method of improving coding efficiency instead provides a better color match for an extracted object.

Claims Rejected under 35 U.S.C. § 103(a)

Claims 23-24 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Itokawa in view of Chen et al. (U.S. Patent No. 6,625,212 hereinafter "Chen"). The Examiner asserts that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the macroblock padding method disclosed by Itokawa to utilize the teaching of Chen to provide a more precise location of the pixel using coordinates in Itokawa. However, Claims 23-24 depend from independent Claim 21, which is patentable for the reasons discussed above. Because a dependent claim is considered to include all of the elements of the independent claim from which the dependent claim depends, dependent Claims 23-24 are patentable for at least the same reasons as discussed above with regard to independent Claim 21. Accordingly, the rejection of dependent Claims 23-24 under 35 U.S.C. § 103(a) over Itokawa in view of Chen should be withdrawn.

Claim 26 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Itokawa in view of Gallery et al. (U.S. Patent No. 6,034,690, hereinafter "Gallery"). The Examiner asserts that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the macroblock padding of Itokawa to utilize the teaching of Gallery to provide the capability of processing MPEG-2 data with higher speed. However, Claim 26 depends from independent Claim 21, which is patentable for the reasons discussed above for independent Claim 21. Accordingly, the rejection of dependent Claim 26 under 35 U.S.C. § 103(a) over Itokawa in view of Gallery should be withdrawn.

Claims 28-29 and 32-35 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Itokawa further in view of Chen. The Examiner asserts that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method disclosed by Itokawa as taught by Chen. As discussed above, applicants' host processor's and its functionality are not equivalent to Itokawa's object extraction unit and its functionality. Also, the term "texture data" is used differently by applicants and Itokawa, and Itokawa lacks the equivalent of a graphics

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primitive. Chen only discloses that the video object is stored in memory (Chen, column 6, lines 53-54). There is no mention of shape data for the video object being stored in memory as the Examiner asserts. Accordingly, the rejection of independent Claim 28 under 35 USC § 103(a) over Itokawa and further in view of Chen should be withdrawn for the reasons discussed above. In addition, Claims 29, and 32-35 depend from independent Claim 28 and are therefore patentable for the same reasons. Accordingly, the rejection of dependent Claims 29 and 32-35 under 35 U.S.C. § 103(a) over Itokawa in view of Chen should be withdrawn.

Claim 30 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Itokawa and further in view of Chen and Kenyon et al. (U.S. Patent No. 6,577,769, hereinafter "Kenyon"). The Examiner asserts that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method disclosed by Itokawa and Chen and utilize the teaching of Kenyon to provide the type of data bus for quickly transferring data between different processing units in a system. Claim 30 depends from independent Claim 28 and is patentable for the reasons discussed above in connection with Claim 28. Accordingly, the rejection of dependent Claim 30 under 35 U.S.C. § 103(a) over Itokawa in view of Chen and Kenyon should be withdrawn. Also, as applicants have already noted above, there would be no reason to modify Itokawa to include a data bus for transferring data, since all of the elements of Itokawa appear to be mounted on a single board.

Claim 31 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Itokawa further in view of Chen and Butter et al. (U.S. Patent No. 5,768,537, hereinafter "Butter"). The Examiner asserts that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method disclosed by Itokawa and Chen to utilize the teaching of Butter to temporarily store data. The Examiner asserts that applicants' predefined latency period is equivalent to the period that *all* macroblocks have been processed to determine padding target data in Itokawa and that Itokawa completes horizontal padding, followed by vertical padding (Itokawa, column 14, lines 42-46). Again, applicants respectfully disagree. In contrast to the cited references, applicants' coprocessor processes all of the horizontal primitives for *one* macroblock before the vertical primitives are processed (see applicants' specification, page 8, lines 16-18). Instead of wasting time and overhead communicating with the graphic coprocessor to determine if it has completed the horizontal primitives, the host processor waits for a latency period, which should be the period of time required by the graphics coprocessor to process all of the horizontal primitives for one

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macroblock. If this latency period has not been surpassed, it buffers the vertical primitives and processes another macroblock. Thus, applicants' latency period is not taught or suggested by the prior art, and applicants' claimed invention is not equivalent to Itokawa's method of padding horizontal, then vertical padding after *all* macroblocks have been processed.

Furthermore, Claim 31 depends from independent Claim 28, which is patentable for the reasons discussed above. Dependent Claim 31 is thus also patentable for at least the same reasons discussed above with regard to independent Claim 28. Accordingly, the rejection of dependent Claim 31 under 35 U.S.C. § 103(a) over Itokawa in view of Chen and Butter should be withdrawn.

Claim 36 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Itokawa and further in view of Chen and Gallery. The Examiner asserts that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method disclosed by Itokawa as disclosed by Chen and Gallery. Claim 36 depends from independent Claim 28 and is patentable for at least the same reasons discussed above. Accordingly, the rejection of dependent Claim 36 under 35 U.S.C. § 103(a) over Itokawa in view of Chen and Gallery should be withdrawn.

In view of the Amendment and the Remarks set forth above, it will be apparent that all claims in the application define a novel and nonobvious invention. Accordingly, this application should be passed to issue without further delay. Should any questions remain, the Examiner is asked to telephone applicants' attorney at the number listed below.

Respectfully submitted,

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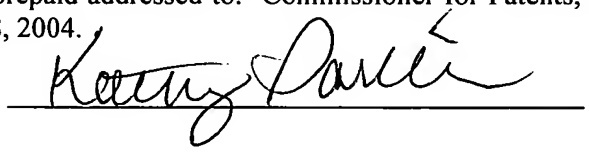

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